NOAA Backgrounder

NOAA's Geostationary and Polar-Orbiting Environmental Satellites

Operating the country's system of environmental satellites is one of the major responsibilities of the National Oceanic and Atmospheric Administration. NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) operates the satellites and manages the processing and distribution of the millions of bits of data and images these satellites produce daily. The prime customer is NOAA's National Weather Service, which uses satellite data to create forecasts for television, radio, and weather advisory services. Satellite information is also shared with various Federal agencies, such as the Departments of Agriculture, Interior, Defense, and Transportation; with other countries, such as Japan, India, and Russia, and members of the European Space Agency (ESA) and the United Kingdom Meteorological Office; and with the private sector.

A WORD ABOUT NOAA. . .

The National Oceanic and Atmospheric Administration (NOAA) conducts research and gathers data about the global oceans, atmosphere, space, and sun, and applies this knowledge to science and service that touch the lives of all Americans.

NOAA warns of dangerous weather, charts our seas and skies, guides our use and protection of ocean and coastal resources, and conducts research to improve our understanding and stewardship of the environment which sustains us all.

A Commerce Department agency, NOAA provides these services through five major organizations: the National Weather Service, the National Ocean Service, the National Marine Fisheries Service, the National Environmental Satellite, Data and Information Service, and Office of Oceanic and Atmospheric Research; and numerous special program units. In addition, NOAA research and operational activities are supported by the Nation's seventh uniformed service, the NOAA Corps, a commissioned officer corps of men and women who operate NOAA ships and aircraft, and serve in scientific and administrative posts.

For further information: NOAA Office of Public Affairs, 14th Street and Constitution Avenue NW, Room 6013, Washington, D.C. 20230.

NOAA's operational environmental satellite system is composed of two types of satellites: geostationary operational environmental satellites (GOES) for short-range warning and "now-casting," and polar-orbiting environmental satellites (POES) for longer-term forecasting. Both kinds of satellites are necessary for providing a complete global weather monitoring system.

A new series of GOES and polar-orbiting satellites has been developed for NOAA by the National Aeronautics and Space Administration (NASA). The new GOES is providing higher spatial and temporal resolution images and full-time operational soundings. The polar-orbiting meteorological satellites are providing improved atmospheric temperature and moisture data in all weather situations. This new technology is giving the United States the most advanced weather forecast system in the world.

Geostationary Operational Environmental Satellites

GOES satellites provide the kind of continuous monitoring necessary for intensive data analysis. They circle the Earth in a geosynchronous orbit, which means they orbit the equatorial plane of the Earth at a speed matching the Earth's rotation. This allows them to hover continuously over one position on the surface. The geosynchronous plane is about 35,800 km (22,300) miles) above the Earth, high enough to allow the satellites a full-disc view of the Earth. Because they stay above a fixed spot on the surface, they provide a constant vigil for atmospheric "triggers" for severe weather conditions such as tornadoes, flash floods, hail storms, and hurricanes. When these conditions develop, the GOES satellites monitor storms and track their movements.

GOES satellite imagery is also used to estimate rainfall during thunderstorms and hurricanes for flash flood warnings, as well as estimate snowfall accumulations and overall extent of snow cover. Such data help meteorologists issue winter storm warnings and spring snow melt advisories. Satellite sensors also detect ice fields and map the movements of sea and lake ice.

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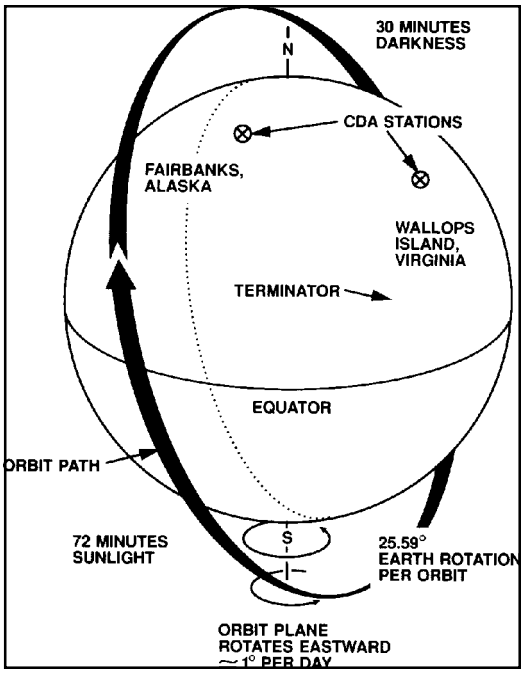
NASA launched the first GOES for NOAA in 1975 and followed it with another in 1977. Currently, the United States is operating GOES-8, launched on April 13, 1994, and GOES-9, launched on May 23, 1995.

GOES-8 and GOES-9

The United States operates two meteorological satellites in geostationary orbit over the equator. Each satellite views almost a third of the Earth's surface: one monitors North and South America and most of the Atlantic Ocean, the other North America and the Pacific Ocean basin. The two operate together to send a full-face picture of the Earth, day and night.

GOES-8 and GOES-9 are aiding forecasters in providing better advanced warnings of thunderstorms, flash floods, hurricanes, and other severe weather. Improved forecasts save lives, preserve property, and benefit agricultural and commercial interests.

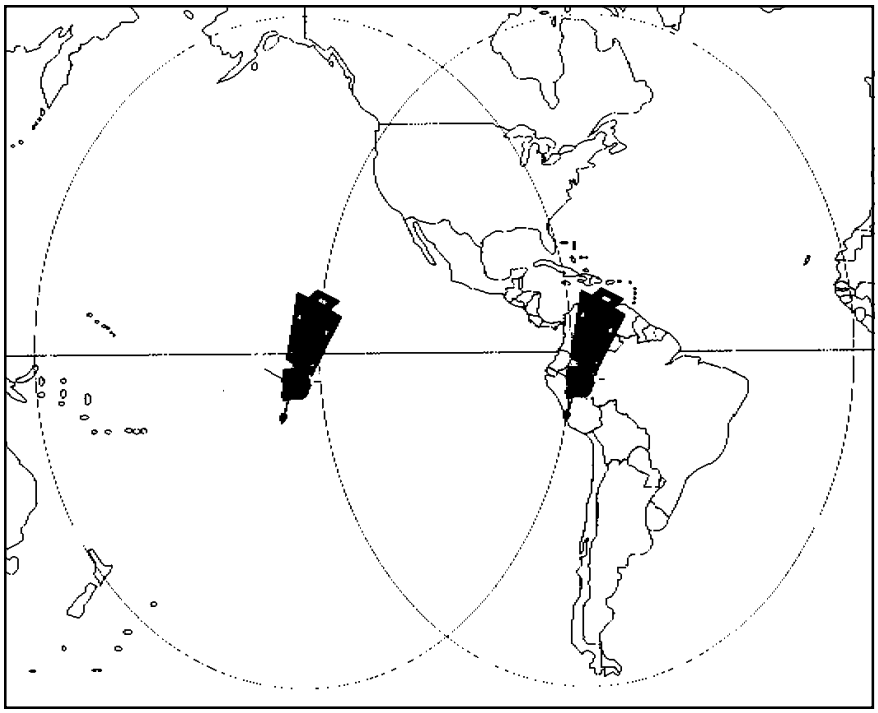
GOES satellites provide meteorologists and hydrologists with detailed weather measurements, more frequent imagery, and new types of atmospheric soundings. The data gathered by GOES satellites, combined with that from new Doppler radars, will make possible a revolutionary flood and water management system devised by National Weather Service hydrologists, greatly aiding water resource managers as they make critical decisions about allocating precious water resources, particularly those of the western states.



Polar-Orbiting Satellites

Complementing the geostationary satellites are two polar-orbiting satellites. Constantly circling the Earth in sun-synchronous orbit (450-nautical mile altitude), these satellites support large-scale, long-range forecasts and numerous secondary missions. The satellites circle the Earth in an almost north-south orbit, passing close to both poles. One crosses the equator at 7:30 a.m. local time, the other at 1:40 p.m. local time. Operating as a pair, these satellites ensure that data for any region of the Earth are no more than six hours old.

The polar orbiters monitor the entire Earth, tracking atmospheric variables and providing atmospheric data and cloud images. They track weather patterns that affect the weather and climate of the United States. The satellites provide visible and infrared radiometer data that are used for imaging purposes, radiation measurements, and temperature profiles. The polar orbiters' ultraviolet sensors also provide ozone levels in the atmosphere and are able to detect the "ozone hole" over Antarctica during mid-September to mid-November. These satellites send more than 16,000 global measurements daily to NOAA's Command and Data Acquisition (CDA) station computers, adding valuable information to forecasting models, especially for remote ocean areas, where conventional data are lacking.



Currently, NOAA has two primary operational polar orbiters: NOAA-12, launched in May 1991, and NOAA-14, launched in December 1994. Follow-on models will be launched as needed in subsequent years.

How Satellites Are Named

NOAA assigns a letter to the satellite before it is launched, and a number once it has achieved orbit. For example, GOES-H, once in orbit, was designated GOES-7. GOES-G, which was lost at launch, was never assigned a number. The same system is used for polar orbiters; for example, NOAA-14, now in orbit, was designated NOAA-J before launch.

Left, the operating GOES satellite positions and their coverage areas: The GOES-West, positioned at 135 degrees W, covers most of the Pacific Ocean; the GOES-East, positioned at 75 degrees W, covers North and South America and the Atlantic Ocean. Upper right, polar-orbiting satellites circle the Earth once every 102.12 minutes.

For more information, contact: NESDIS Public Affairs, Suitland, Md., (301) 457-5005.